

## ABSTRACT OF THE DISCLOSURE

The present invention demonstrates that BMP-2/4  
activates osteopontin gene transcription by removing Hoxc-8 binding  
5 through Smad1 interaction with the Hoxc-8 DNA binding domain.  
Since the DNA binding domain is conserved in all Hox and  
homeodomain-containing proteins, Smad1 likely interacts with all  
Hox or homeodomain-containing proteins. Furthermore, the present  
invention reveals the Smad1-mediated transcriptional mechanism in  
10 the BMP-2/4 signaling pathway and also provides information about  
the transcriptional roles of the Hox genes during embryonic  
development.